WASHINGTON STATE UNIVERSITY
KING COUNTY EXTENSION

King County

Ditch Maintenance Research Project

February 2004 Status Report:

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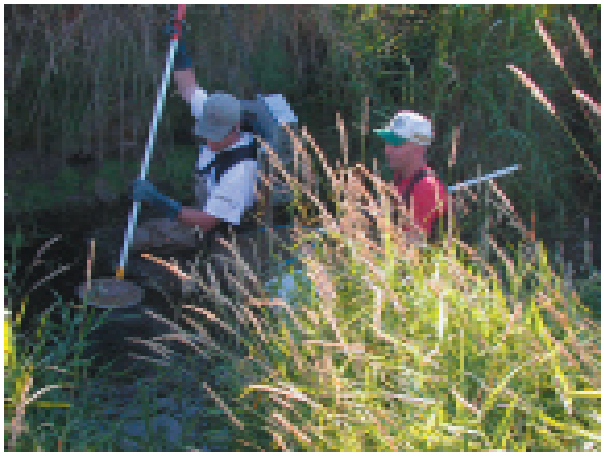
Program Overview and Purpose

King County is funding Washington State University (WSU) and the University of Washington (UW) to conduct a 5-year research project on the effects of maintenance of agricultural waterways on water quality, fish habitat, vegetation, and sediment control. All parties in this program (WSU, UW and King County) are committed to ensuring that you stay informed about the research findings.

This research will look specifically at the Best Management Practices (BMPs) outlined in King County Administrative Rule 21A.24, Maintenance of Agricultural Ditches and Streams Used by Salmonids. The long-term goal of this project is to identify effective ways to maintain agricultural watercourses while protecting fish habitat and water quality. This research is carried out under "take" permits issued by the U.S. Fish Wildlife Service and the National Marine Fisheries Service as authorized under Section 10 of the Endangered Species Act of 1973.

Updates and Research Progress Reports- This is our second annual progress report, outlining research program events during 2003. It is important to remember that we are still in the early stages of this research, and the conclusions presented are based on a limited amount of data and should thus be viewed as tentative. As the research progresses and we collect more data, our conclusions may be revised. In this report, we highlight results from the vegetation, water quality, and fish habitat utilization components of the research project.



Researchers sampling fish in an agricultural watercourse. *Photo B. Gaolach*

Vegetation - The objectives of the riparian vegetation enhancement component of this project include a) developing a BMP protocol for the effective control or eradication of reed canarygrass (RCG), and b) determining a method for providing native ground cover and woody riparian vegetation that is vigorous, produces shade, and provides habitat for insects that constitute prey for salmonids.

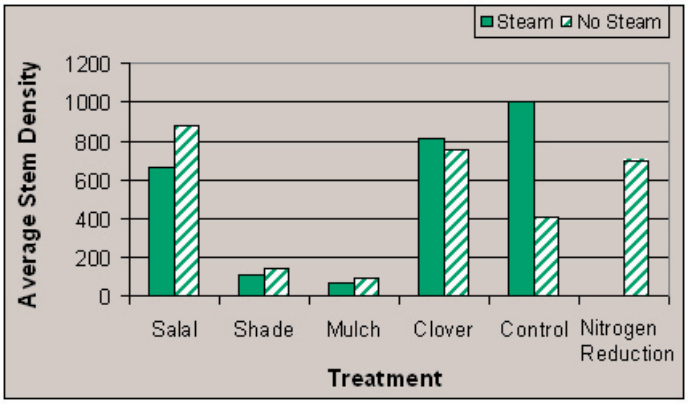


Figure 1. Results of reed canarygrass control research. There was no steam with nitrogren reduction treatment.

In the fall of 2002 through the spring of 2003, a pilot project was conducted to look at effective ways to control or eradicate RCG. The pilot research efforts determined that growth of RCG could be inhibited by steam, shade, or allelopathic material (plants or mulch). Allelopathic materials give off compounds that inhibit the growth of other organisms, RCG in this case. Several studies have found that shade reduces the growth of RCG; however, there has been limited research done on using steam and allelopathic material to control RCG. Data from this pilot project are shown in the figure 1. In summary, the allelopathic mulch (red cedar hog fuel) and shade material suppressed RCG growth more effectively than the other treatments tested (plantings of salal or clover, and nitrogen reduction), regardless of whether steam was used to kill the RCG prior to applying the shade material or mulch.

In the fall of 2003, a larger research project was initiated at three local farms, building upon data collected during the pilot study. This research will use a combination of the shade and allelopathic mulch treatments to suppress RCG re-growth, along with an innovative planting design

Reed canarygrass in an agricultural watercourse.
Photo D. Sheppard

intended to increase the likelihood of native riparian vegetation establishing and eventually out-competing the RCG. These experiments will compare willow only plantings to multiple species plantings consisting of black twinberry, Pacific ninebark, oceanspray, Indian plum, small-fruited bulrush, and other species. The multi-species plantings aimed to provide a more diverse, shade-producing vegetation canopy.

Water Quality- During 2003, the water quality research component of this study focused on two main topics: a) developing a working model for predicting the effects of agricultural watercourse maintenance on water temperature, and b) evaluating the effects of different types of vegetation on water temperature.

In situations where bank vegetation plantings are successfully established, willows have been found to be effective species for shading small watercourses (channels that are up to 1.5 meters in diameter). Pre-project water temperatures were lower in watercourses lined with a mixture of willows and blackberries than in channels dominated by RCG. These data indicate that a riparian zone comprised of mixed vegetation is more effective in moderating water temperatures than RCG alone.

Data collected at 10 field sites in King County, representing four distinct bank vegetation types (RCG, Himalayan blackberry, willows, and a mixture of Himalayan blackberry and willows) were used to develop and calibrate a model used to predict water temperature following channel maintenance coupled with various vegetation planting scenarios. The model uses weather data, watercouse temperature, watercourse discharge, channel morphology, local topographic data, and the dimensions and density of riparian vegetation to predict water temperatures. Following calibration, the model accurately predicts water temperatures. With this model, we will be able to run virtual simulations to test the effects of many different combinations channel morphology and riparian vegetation on temperature in agricultural watercourses following maintenance.

Fish Removal Techniques and Fish Habitat Utilization- During four sampling events conducted in 2003, nearly 1,500 fish were collected, representing at least 14 different species. Over half (806) of these were juvenile salmon or trout, the vast majority of which were coho salmon (757). Eight juvenile Chinook salmon (listed as threatened under the federal Endangered Species Act) were collected.

These data are not sufficient to allow us to draw conclusions at this time. By July of 2004, we will have completed two full years of fish sampling during a total of eight quarterly sampling events. This should yield sufficient information to allow data analysis aimed at answering some of our research questions.

In April 2003, a new group of young coho (referred to as a cohort) appeared in our study sites, averaging about 45 mm (1.75 inches) in length (see Figure 2). These fish hatched in nearby river and stream systems during the previous winter of 2002-2003, and emerged from the gravels in February and March before moving into our study sites to feed and grow. Although only some of our data has been analyzed so far, the coho salmon we collected in these agricultural watercourses appeared to be healthy and in very good condition. Growth rates (length at age) appear similar to those of coho salmon collected in natural stream channels elsewhere in the Puget Lowlands.

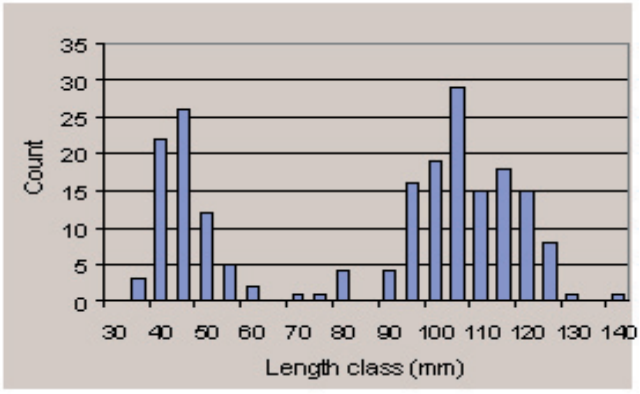


Figure 2. Length data for coho in agricultural water-

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